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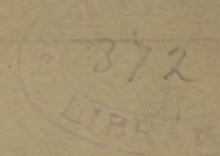
COMPENEN'S OF
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INTESTINAL ANASTOMOSIS.

BY

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SURGEON TO ST. LUKE'S HOSPITAL, NEW YORK; CONSULTING SURGEON TO THE
HOSPITAL FOR RUPTURED AND CRIPPLED; PROFESSOR OF CLINICAL
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[Read May 8, 1889.]

ABOUT three years ago a lady came to me from the South with a fecal fistula in the right groin, resulting from the sloughing of five inches of intestine in a strangulated hernia. Three physicians had made intelligent operative efforts to close it, and left her only worse off, as the distal end had slipped back and been lost in the abdomen. The case was a challenge to surgical skill. During several months I made careful and conscientious attempts to cure her. At first, the abdomen was opened to search for the distal end; it could not be found. Therefore, I stitched the proximal end and the ascending colon side by side in the wound, and a few days later opened the colon. A permanent channel was thus established between ileum and colon, when the fistula was capped, and some movements occurred per anum. Dupuytren's enterotome was then applied, and the spur cut through for two and a half inches. Still the big fistula leaked most of its contents.

Two elaborate plastic operations were then done, using the abdominal skin after the manner of Czymanowski, by which I had closed urethral fistulæ. But these proved futile, and she remained with the usual excoriated abdomen, filthy wound, and marasmus. My colleague, Dr. McBurney, then tried a partial resection of the edges, with inversion and suturing, and from this operation she died.

I have narrated briefly this case to illustrate what you know represents a considerable class of sufferers whose fecal fistulæ until very recently have baffled the surgeon. Such cases rankle in the memory of us all, as marking the limit at which successful work comes to a halt. To-day, thanks to the untiring energy and genius of Dr. Senn,

of Milwaukee, such, and many other cases, can be offered the hope of immediate relief by intestinal anastomosis.

The principle of intestinal anastomosis is by no means new. It is on the technique of operative procedure only that its appeal to renewed favor rests. I need not narrate to you the methods formerly in vogue to restore the intestinal canal. Plastic operations, resections with circular enterorrhaphy, and lateral apposition with suturing, have had a certain value for many years; the unanswerable objections to them all being a dangerous consumption of time, frequent leakage, and secondary abscesses. With Senn's researches, new life has been infused into this branch of surgery. I will not review his work, but remind you for the moment that it covers the ground of the experimental production of intestinal flexion, volvulus, stenosis, invagination, and resection, and in reparative work the study of two methods of restoring the intestinal canal—lateral implantation of a smaller into a larger gut, and lateral apposition of openings into similar portions of bowel. The outcome of it all has been an anastomosis of an interrupted intestinal canal by the safe and speedy method of using decalcified bone plates for approximation. I believe the value of this method will soon be recognized everywhere. His experiments have already been repeated by several and the results uniformly verified.

Those done by Mr. F. B. Jessett and Mr. Victor Horsley, and reported six weeks since to the Royal Medical and Chirurgical Society, are noteworthy. Jessett adds his statistics to those of Senn and Curtis, and finds that approximation by the Czerny-Lembert method showed a mortality of about $86\frac{1}{2}$ per cent. against 25 per cent. by the method of lateral implantation, and $7\frac{1}{2}$ by means of Senn's bone approximation disks. A method which thus offers an advantage ten times as great as the old one in mortality, and that can be done in one-third or one-quarter of the time, may well inspire enthusiasm.

The application of this principle to man has as yet been limited. Dr. Senn has in six cases applied the plate method in gastro-enterostomy for cancer of the pylorus with results detailed in four of them in his *Intestinal Surgery*. The two recently done are also successful.

Dr. Fenger, of Chicago, and Dr. Hunter, of Minneapolis, have also used them. Successful each in one case. Dr. Ransohoff, of Cincinnati, operated Dec. 31st for gastro-enterostomy by plates in a case of malignant pyloric stenosis with excellent success.

An extended search fails to find other recorded cases. My own experience includes some experiments on dogs, and two successful applications to the human subject. The man whom I first operated

on lived three and a half months after I united his ascending and transverse colon by Senn's plates on either side of a malignant stenosis of the hepatic flexure of the colon. His case has been fully reported in the *New York Medical Journal*, March 23d, last.

The essential points of the case were, progressive obstruction, enormous fecal accumulation, marasmus, and finally collapse—relieved by a colotomy done when he was *in extremis*, and followed six weeks later by colo-colostomy with Senn's plates, Nov. 14, 1888. After this he rapidly gained and in three months was enjoying excellent health. Suddenly there ensued a painless diarrhoea that could not be checked. Rapid emaciation and death followed in twenty days. Autopsy showed that nature had made an artificial opening between the duodenum and transverse colon at the site of malignant stricture. Thus all the small intestine had been excluded, and food passed practically from his stomach directly into his colon undigested; and starvation followed.

The specimen which you see shows perfectly the aperture between the portions of colon. It is an oval the long diameter of which is an inch and a quarter; nearly as long as the incision made three months before. It shows there is little to be feared from the contraction of the opening, and it also shows that an opening very much smaller than the diameter of the bowel is competent to allow one part to empty into another.

I would have been very glad to be able to make a larger opening, but this was about the maximum possible by using Senn's plates. The patient had had daily evacuation of the bowels, but it had been half the time through the use of mild cathartics. A larger opening would have obviated the use of these.

The needs of this case, coupled with the facts that I had not been able to get large enough plates to suit the colon, and that the preparation of decalcified bone plates consumed several days and considerable labor, led me to review the ground that had been gone over to get a more available material. I was aware that almost every known soluble substance had been tried, including cartilage which Jobert and others had used. I devised a ring of rubber made in segments fastened by catgut which would fall apart after a few days, but abandoned that when I made a stiff one entirely of catgut, which, being wholly digestible, would accomplish what the plates of bone would and then disappear. I made some small sets and tried them on a dog, with the assistance of Dr. Weir and Dr. B. Farquhar Curtis. The beautiful results are seen in these two specimens. When the gut was

cut, the ends were invaginated and sutured by continuous Lembert stitch. The two ends being laid side by side, a longitudinal cut was made in each near its end, a ring slipped into the gap in each and four sutures on the ring stitched through the edge of the gap. The corresponding threads now being tied, pulled the two rings together, and the edges of the opening were thus sandwiched, as it were, between two rings. Four extra silk stitches were added outside to prevent the lips of the cuts puffing out between the first threads.

The proof of the security of apposition is seen in the dog's recovery. Evacuations were free and regular after the operation, and each of these specimens were taken out with the dog in perfect health nine days after the operation. The union was so perfect that the intestine would have burst elsewhere sooner than given way at this place. The catgut had entirely gone; a few of the silk threads that held them were yet loosely hanging in the puncture points, ready to come out on slight pulling. The coils of approximated gut, though performing their functions well, showed considerable contortion, and in two later experiments, the results of which are here seen, I turned the divided ends to look in opposite directions with better result. These were done on the same dog at the same time, and were made to show a class of physicians the advantage of this method where multiple resections of the gut might be called for, as in gunshot wounds. Four inches of intestine were cut out at each place, and the catgut apposition rings applied, the ends being reversed. The result has been perfect. A very large aperture of communication has been obtained by the long narrow ring, which so easily slips into the bowel. The twisting of the adherent coils was not nearly so much as in the former case. I am convinced that by the two expedients of using long narrow apposition rings to obtain a large opening, and by placing the intestines as suggested, to obtain continuous peristaltic wave, we obviate a temporary blocking of the operated part which must obtain with the bone plates and small openings, and which leads to much twisting.

In this experiment it took exactly fifteen minutes to resect and complete each apposition. This includes a continuous outside silk suture around the circumference of the ring, which was applied quicker than half the number of interrupted sutures could have been.

An opportunity now came to put in practice the method above described. In November last a woman of slight build and thirty years old came under my care at St. Luke's Hospital, with a history of uterine disorder for two years, and presenting a small tumor in the

right iliac fossa. She had vomited, become anæmic, suffered much local pain, and had developed night-sweats with slight hectic. Pyosalpinx was diagnosed and operation advised. A five-inch median cut was made above the pubes. The diseased mass with omentum and coils of small intestine intimately adherent, was found to be a suppurating ovary as large as a goose-egg. Some intestines were stripped off, others seemed too firm. One of my assistants, a distinguished disciple of Mr. Tait, being asked to examine to see whether the tumor could be removed, or whether it had best be scraped out and drained, succeeded, while examining, in digging the ovary from its bed, after the manner of Tait, who says no tumor of this character need ever be left no matter how firmly adherent. I was surprised and delighted to be shown that this mass could be thus removed by the fingers. Notwithstanding that the suppuration had been disseminated in the wound, it was readily douched away by copious hot-water effusions; but great chagrin followed the immediate discovery that a circle more than an inch in diameter had been torn from the side of an adherent loop of intestine and was on the tumor. Feces appeared at once in the deep cul-de-sac of the pelvis. I promptly found and sutured the damaged bowel, irrigated and applied a tamponade of iodoform gauze lightly, and closed the wound except for drainage. Two days later, feces welled up in the wound, and a horrible, and, I feared, a hopeless fecal fistula was thenceforth established. *la*

During the following six months the patient passed through not only the suffering incident to her fecal fistula, but also a severe attack of scarlet fever with acute desquamative nephritis. And when I returned to hospital duty I found her emaciated and weighing less than seventy pounds. Her abdominal wound healed, except over the pubis, where a long funnel-shaped wound, lined by poor granulations, gave vent to her entire fecal discharge, which came from the depths of the pelvis. The skin about it was sadly excoriated, and too tender to allow adhesive straps to retain dressings. She was of a cheerful disposition, and hopefully looked to me to relieve her, even at the risk of life, which had become a burden. With the picture in my mind of the intestines matted together, and in the midst of all a portion whose lumen was destroyed, from which feces poured in the site of the ovarian abscess, I looked upon the case with grave doubt of cure.

The more so, because she had been subject to a hectic, with daily exacerbation of temperature to 102° and 103° up to the day of operation. My experiments with intestinal anastomosis, however,

gave hope, and on March 22d—six weeks ago—I operated in the presence, among others, of your President, Dr. Keen.

Ether anæsthesia was used, notwithstanding she had five per cent. of albumin in her urine.

I dissected out the poor cicatrix around the funnel-shaped fistula, and opened the laparotomy wound upward. The intestines in the entire lower abdomen were matted firmly together, and uniformly studded with miliary tubercles. The pathologist's report confirms this, and I presume the original ovarian mass was a tubercular ovary, though I regret to say it was mislaid at the operation. With great care the intestine leading to the fistula was dissected out on either side of it for four inches, and cut squarely across. The ends were then turned in for half an inch and closed by a single row of continuous Lembert sutures of fine black silk. It was impossible here to turn the ends in opposite directions, and they were laid side by side, split open longitudinally for an inch and three-quarters, nearly to the end, and united by catgut apposition rings, with a half-dozen reinforcing silk stitches outside. The entire wound was douched liberally with hot water, and a portion of the deeply adherent gut between the cut ends was further dissected away. The wound was closed, except for a light tamponade of gauze at the site of the fistula.

The patient rallied nicely, had no pain whatever afterward, and no feces came into the wound. She had a little vomiting the next day, but retained koumys and champagne, an ounce every two hours, in drachm doses. At the end of the fourth day, her temperature having risen to 102°, I gave liq. magnes. citrat. $\mathfrak{z}\text{iv}$, and repeated. Three natural and painless movements passed by the rectum for the first time in six months, and her temperature fell to 100°.

Daily movements took place from that time on, at first assisted by four ounces of magnesia every third day. The wound granulated nicely, and no feces have ever appeared there.

The patient walked about after the fourth week, and is restored in appetite and health. She now gains three pounds weekly, is free from pain, and is making a happy convalescence. Her evacuations are normal and regular, well formed, and occur without the use of medicines.

Thus is completed a proof of the efficacy of a new method, treating a malady which I know of no other method as competent to cope with.

I can hardly conceive of a fecal fistula in any part of the bowel (except, perhaps, low in the rectum), that may not be safely cured by this method, provided the distal portion is not blocked by disease.

In cases of gangrenous hernia, bullet or other wounds requiring exsection of a portion of the bowel, it may be applied at once, or after an artificial anus is established and the patient is convalescing.

No surgeon or physician need hesitate to make a fistula to relieve obstruction, or in other suitable cases where the equipment to complete the immediate anastomosis is not at hand, or where the patient's condition will not endure much interference, as in the first case narrated.

Two weeks ago my friend, Dr. Charles McBurney, applied a set of my catgut rings to a case of gastro-enterostomy, and writes as follows:

"The case was one of cancer of the pylorus which caused total obstruction. The patient would not consent to an operation until he was nearly moribund. The anastomosis was made between the highest part of the jejunum and the anterior of the stomach, near the greater curvature, and about three inches from the pylorus.

"The operation was perfectly easy and rapid, and the rings acted perfectly. The whole operation took forty-five minutes, much time being lost on account of imperfect washing of the stomach beforehand. I think it could easily be done inside of thirty minutes.

"Death occurred from inanition about twelve hours later. On careful post-mortem test, the stomach being filled with colored fluid and held up, absolutely no leakage at the site of operation occurred."

To make the rings most efficiently the following steps must be observed: A moderately heavy catgut is chosen; taken from alcohol or juniper oil, it is wound loosely on a test-tube and soaked in hot water. It soon kinks up, and were it not on a tube could hardly be unravelled. After a while it is straightened out, allowed to untwist, wound again loosely, and soaked in hot water once more, until it ceases to twist. It is then ready to make up into rings, which will lie perfectly flat. Eight or ten turns over two pins stuck in a cork two inches apart, will make a bundle somewhat smaller than a lead pencil. These may be tied at four places with fine silk, to secure the strands parallel while being wound round like a cable, with a continuous piece of the same catgut. The end of the piece is secured by threading it into a Hagedorn needle, and transfixing the whole bundle obliquely with it at the place of finishing. Thus there are no knots, and it is difficult to find the point of beginning.

The ring is now a long oval with an inside diameter of two inches, and in thickness smaller than a pencil. Six strong but small braided silk threads are now fixed to each ring, equidistant, on the face looking toward the other ring which is to be laid against it.

No knots are used. A needle pierces the ring between the strands, carrying the thread, which is drawn through, all but eight inches, and wound once and a half round, sinking between the encircling catgut, piercing the ring again, and cut off. The rings, which have now been water-soaked, are ready for use if needed for emergency; but, if possible, they should be kept awhile in alcohol, under pressure between two glass slides, the threads being curled up within the oval, and the sides being pressed together after the glasses are tightly tied together. The ring thus becomes a long oval with parallel sides, and soon becomes harder and flattened on its faces. Moreover, it shrinks a trifle in alcohol, to swell again in the intestine and give additional security.

In using the rings, I find it saves time to have each thread have its own needle. The intestine is pierced from within outward less than a quarter of an inch from its cut edge. The ring should be laid on a damp folded towel with threads in order and needles stuck in the towel, which is held by the assistant close to the bowel, while the operator quickly pulls the threads through and passes the ring into the interior of the bowel. When the threads are tied and cut off, the apposition is perfect, but by a quickly made running suture outside all, a half inch of peritoneal surface is at once secured beyond the possibility of leakage. More than this is superfluous, for the edges held between the rings act as valves.

In invaginating the end of the cut intestine after exsection, one will delay a long while if he tries to turn in first one and then the other edge, and will also find the mesentery try to turn in after it on the attached side. My rule is to trim back the mesentery at least a half inch from the end. Then seizing both lips with toothed forceps, plunge them directly into the lumen. The entire edge usually follows, and one holds them by the left index finger and thumb while a quick running overhand suture of the slit thus formed is made.

DISCUSSION.

DR. JOHN ASHHURST, JR.: I think that we are all much obliged to Dr. Abbe for coming here and giving us this clear demonstration of a mode of dealing with intestinal fistulæ which I regard as one of the greatest improvements introduced in the whole field of abdominal surgery—certainly of intestinal surgery. As Dr. Abbe has said, the old methods of dealing with intestinal fistulæ are not satisfactory, either as regards the time required for their success, when they do succeed, or as regards the prospect of success

itself. The use of Dupuytren's enterotome, or of some other form of enterotome, is attended with the least risk of any of the methods which can properly be called operative. A few cases have been cured by Desault's compress, which was particularly recommended by the late Dr. Otis, and where the fistula is small, a cure may sometimes be effected by some variety of plastic operation. A case of this kind was under my care some years ago; the opening was small and I succeeded in closing it by a deep dissection without opening the abdominal cavity. As a rule, however, such treatment will not succeed.

Then we have resection with circular enterorrhaphy, which has been practised with success in a number of cases, but which is a tedious operation, and always liable to end in failure. It is difficult to make the apposition perfectly accurate; and even if this is accomplished, there is of necessity such narrowing of the gut at the point of suture, due to the turning in of the two ends of the bowel, that it often lays the foundation for a fresh stricture. I therefore consider, as I have already said, this plan of lateral anastomosis to be one of the greatest improvements made in this department of surgery. I have not had the opportunity of using either the bone plates of Prof. Senn or the catgut rings of Dr. Abbe, but am disposed to think that the rings are better than the plates. Besides giving a larger opening, they would seem to be more easy of adjustment, more likely to adapt themselves to the shape of the parts, and more apt to effect accurate apposition.

The suggestion of Dr. Abbe that the two portions of gut should be so placed that the peristaltic wave may be continuous, seems to me also of much value. One would certainly suppose that this would render the restoration of the natural function easier than for the intestinal contents to be made to turn a sharp corner, as it were, in passing from one portion of the bowel to the other.

Of the various terms used to designate this operation, lateral anastomosis is, I think, the best. It expresses exactly what is meant, and every one is familiar with the term anastomosis as applied to the union, for instance, of one vessel with another. The terms gastro-enterostomy, entero-colostomy, and the like are open to a certain amount of objection, since the latter portion of these terms implies the formation of a mouth. Although it may be a little out of the direct line of the discussion, I would call attention to the abuse of the term enterostomy as applied to an opening for the establishment of an artificial or false anus. The term enterostomy means the formation of a mouth in the intestine. It has a proper application in the operation of Surmay for the making a mouth in the upper part of the small intestine in cases of pyloric obstruction, just as gastrostomy is employed for the operation of making a mouth in the stomach in cases of obstruction of the œsophagus. This is proper, but to apply the word enterostomy to signify the formation of an artificial anus is an abuse of terms; for a mouth is not used for the passage of fecal matter, but for the introduction of food. There is to some degree the same objection to the terms gastro-enterostomy, etc., whereas to speak of lateral anastomosis of the stomach and intestine, or of the gall-bladder and intestine, etc., would not be liable to misapprehension, since, although etymologically the word anastomosis means a joining of mouths, it

has by long usage come to have a special and definite signification in medical nomenclature.

DR. J. PRICE: Every surgeon has welcomed Senn's new method, which promises such perfect results within certain limits, but these limits must be recognized. I will again urge and emphasize what I have so often spoken of in this Society, that the first province of the surgeon is to save life and relieve suffering, and to these ends he should direct all his efforts. The ideal operation is an after-consideration.

Obstruction of the bowel presents itself in two general forms, acute and chronic. In the acute form the condition of the patient is almost always perilous. Shock and collapse are prominent, and in many cases a long operation will be the last straw. This, I think, is called attention to by Dr. Abbe when speaking of his first case. The large number of acute cases are due to kinking, twisting, or strangulation by bands. Here simple releasing is all that is necessary. This has been my experience in pelvic cases, in which we most commonly find adhesions and disease of a knuckle or more of the intestine. As in Dr. Abbe's case, it is exceedingly common to find a diseased bowel adherent to a pus tube or abscess of the ovary. It is often a question whether we shall do a resection or trust to trimming and suturing. I have many times in the most careful enucleations torn the bowel through to the mucous coat and have found a piece on the pus tube or ovary. I have in these cases always stitched the serous coat without narrowing the calibre of the bowel. In but one instance have I seen a fecal fistula. That was in the case of an inexperienced man where I had not full sway. The fistula, however, lasted only a few days, and the patient made a perfect recovery.

Some time ago I reported a group of cases, and called attention to the frequency of intestinal obstruction due to tubal disease as a primary cause.

In any case in which the obstruction has existed a few days, the portion of bowel involved becomes extensively diseased, often necessitating, as in gangrenous hernia, resection. Here the establishment of the continuity of the bowel must be supplemented by the removal of the diseased section, and the operation is usually a failure. Again the bowel is diseased for some distance from the lesion, and experience shows that plastic work on diseased intestines is exceedingly perilous. The sutures will slough out and leave fistulæ. Whether excision with lateral anastomosis will accomplish better results than resection, the making of an artificial anus followed by an ideal operation, is an open question. In chronic cases and secondary operations, the patient will, as a rule, bear more operative interference, and it is in this class of cases that lateral anastomosis will give the best results. In malignant cases it will afford temporary relief and prolong life.

Some figures illustrating these points in regard to diseased bowel were given before the Royal Academy of Medicine last year by Mr. I. S. McArdle, of Dublin. Of 76 cases of resection for gangrenous hernia 41 died; 4 of these died from overloaded bowel, a very common complication in chronic cases. Sometimes, as a result of this, the serous coat is broken throughout. Of 13 resections for intussusception, 10 died from gangrene from suturing inflamed tissues. Of 49 resections with artificial anus, 19 died—14 in collapse and 5 from yielding of the suture—4 of these cases being at the mesenteric

border. The success of these operations depends largely upon the accuracy with which the sutures are applied.

There seem to be but few anatomical points at which this method cannot be applied. Dr. Abbe speaks of the rectum as being about the only point. There are a few lesions liable to occur at this point; for instance, stricture due to ectopic gestation. I recently saw a case in which two inches of the bowel were intentionally removed with the product of conception. There it was not possible to do more than place the ends of the bowel in apposition, and do the best suturing that could be done under the circumstances. The result in this case was simply surprising. It was impossible to make an artificial anus as the adhesions were too great. Notwithstanding the difficulty in approximating the ends of the bowel there was at no time any discharge of gas or feces from the wound, and the patient made a perfect recovery.

DR. J. M. BARTON: I am greatly interested in the subject discussed by Dr. Abbe, and I think that his suggestion of catgut rings in place of the bone plates of Dr. Senn is a valuable addition to surgery. So unsatisfactory have the other methods proved that they are rarely used. It is really a question whether gastro-enterostomy, as performed by the older methods used before the investigations of Dr. Senn, is a justifiable operation. By the method described to-night, the mortality must be much lessened.

Some time ago, in a case in which I operated for strangulated hernia, there was a loss of ten or twelve inches of intestine, followed by inflammatory peritonitis. The section was made some weeks subsequently, by my colleague Dr. Gross, who was then on duty, with the object of bringing the two ends together. This was found to be impossible on account of the matting of the parts. Dr. Gross, therefore, took the distal extremity of the upper bowel, made an opening into the colon, and brought them together outside of the wound and applied Dupuytren's enterotome. The reapplication of the instrument two or three times cured the artificial anus and a fistula was left from which there was very little leakage. After removing a section of cancerous bowel I adopted this procedure with success. I found in 24 reported cases, that in 15 where the bowel was at once brought together by the older methods there were 9 deaths; while in 9 cases where a temporary anal fistula was formed, there were but 4 deaths. By the latter method I have had several successes. The only difficulty is the frequent application of the enterotome and the persistence of a fistula. This need not necessarily be troublesome. I saw, to-day, a patient whom I recently treated, leaving a fistula through which sixty or seventy per cent. of the matter was discharged. He reports to-day that nothing has passed through the fistula for three weeks. The method suggested by Dr. Abbe presents such advantages that I shall be prepared to use it in the future. I have prepared the plates of Senn, and have had them ready for use several times, but the small size of the opening made me fear they would not act well, and I adopted other methods.

DR. C. B. PENROSE: My experience with this operation of intestinal anastomosis is limited entirely to experiments on the dog. The results may be of some interest because I used a method somewhat different from those mentioned. Instead of using the bone plate of Senn or the catgut ring referred to by Dr. Abbe, I used a rubber ring sewed together with catgut; instead of using silk sutures I employed catgut. In five or six days the catgut would

be absorbed, and the rubber would adapt itself to any shape for passage through the intestinal tract. In all cases the rings passed within ten days after the operation. There is no advantage in this method over those mentioned, except that the material employed may be obtained when bone or catgut is not available. This specimen from a small dog shows the shape of the opening left. The rubber disks can be cut of the necessary size and shape from ordinary sheet rubber. In most of my experiments, instead of using reinforcing Lembert sutures, I placed a circular omental graft around the line of union.

DR. ASHHURST: I should like to add a few words to what I have already said. I do not understand Dr. Abbe to recommend that intestinal anastomosis should be adopted in the treatment of intestinal obstruction, but in cases of fistula which may result from obstruction or other causes. I think that it is a well-established fact in surgery that the line of safety in intestinal obstruction in which it is necessary to remove a portion of the bowel, is to establish a temporary false anus, and to postpone to a subsequent occasion the attempt to restore the continuity of the bowel by this or some other method. The only exception recognized is where the portion of the bowel removed is so high up or where it is so large that a great portion of the intestine would be thrown out of use. For instance, if it were necessary to remove a portion of the jejunum high up, the establishment of an artificial anus would leave so small a portion of the bowel for digestion, that the patient would starve to death, and in such a case it would be proper to endeavor to restore the continuity of the gut at once, although the immediate danger of the operation would be thereby increased. Where, however, the portion removed was lower down in the small intestine, or in the large intestine, the proper course would be to make a temporary artificial anus, let the patient get over the effects of the obstruction, and at a future time endeavor to restore the continuity of the bowel by whatever method might seem proper.

DR. WILLIAM HUNT: I have performed a number of operations, plastic and others, for the cure of artificial anus; in some the opening was large, in others it was small. I have met with only partial success. Unless the opening was very small, I do not recall a case of complete cure. I think that the method suggested to-night offers the best means we have of operating in cases of non-malignant disease of the bowel. I have, however, had no personal experience with it. Ante-mortem operations on malignant disease of the intestine have no attractions for me.

DR. JOHN B. ROBERTS: While I have had no experience with this method, the demonstrations which we have had to-night convince me that directly and indirectly a great deal of good will be done by this method of Senn, Abbe, and Penrose. I vividly recall a case that I lost because I was not sufficiently familiar with these operations to shoulder the responsibility of making an artificial anus. This case was seen shortly after Senn's method had been described. I was called to operate on a strangulated hernia in the country where the patient could not receive much subsequent surgical attention. I found the bowel pretty blue. I debated some time whether it would be better to make an artificial anus or return the bowel. I thought that I had seen the circulation return in bowels as blue as this one, and taking all the circumstances of the case into consideration, decided to return the bowel.

The external wound healed rapidly and well, and everything appeared to be right, when suddenly on the fifth or sixth day, in the absence of the attending physician, the patient was seized with intense abdominal pain and expired in a few hours from what I undoubtedly think was a perforation made by a slough of the intestinal wall. If I had been present, I would have done an immediate laparotomy. I think if I had such a case, after hearing this paper; that I should be much more likely to make an artificial anus, and run the risk of curing it subsequently by intestinal anastomosis.

Another indirect result of this method of operating will be that we shall deal with malignant disease more satisfactorily than has been the case heretofore. I hardly share Dr. Hunt's averseness to attacking malignant disease. After making this artificial anastomosis in a case of malignant disease of the intestine, it becomes a proper question whether at a subsequent time the abdomen should not be opened and the cancerous mass be excised with the hope of a radical cure. I believe that in many cases of malignant disease, early, radical, and repeated removal may finally effect a cure. I do not see why with this method we cannot attack malignant disease of the intestine at a much earlier period. I have never been inclined to adopt the excisions done at Vienna and other places for intestinal and pyloric malignant growths, but with lateral anastomosis there is possibly a chance for a safe or even a radical cure by operation.

We should not try to make an ideal operation in prolonged obstruction with a distended gut, but relieve obstruction and subsequently treat the artificial anus left. The indirect results of the efforts of Senn, of Abbe, and of Penrose will be greater than any of us imagine to-night.

DR. M. PRICE: This paper has much interest for me, and three months ago would have been of vast service. I had a case of strangulation the result of epithelioma involving four inches of the bowel, the obstruction being almost complete. The obstruction had continued eleven days, but the patient was in moderately good condition. With the method which has been described to-night it would have been easy to unite the two portions of bowel, and this would have saved an immense amount of trouble and annoyance. The patient is of a nervous, irritable temperament, and the application of Dupuytren's instrument causes great annoyance. The subsequent management of the case will probably be difficult, unless this method be adopted. The belly is large and flabby, and the closure of the external wound will probably be a matter of difficulty.

The paper is of much value to me for other reasons. Eight days ago I was called to a case of strangulated hernia. The bowel appeared to be in an almost gangrenous condition, and it was decided to resect three or four inches of it. After releasing the constriction the color returned to the bowel, and we concluded to allow it to remain. The patient is making a good recovery. There was a case where I had decided to resect. If I had had the appliances shown to-night, I have not the slightest doubt that resection would have been done, and I believe that the results would have been as good.

In pelvic work it is impossible in some cases to avoid tearing the bowel; having such an easy method of closure I should not fear the result. I should have no hesitation in cutting out a portion of the bowel diseased and

thickened, which offers very little chance of good recovery, and bring the portions of the bowel together by the method suggested by Dr. Abbe.

DR. J. M. BALDY: It is evident to every one the immense strides we have made in intestinal surgery since Senn introduced his practice of lateral approximation. There is one point in the discussion which has not been dwelt upon; that is, the comparative value of the three materials which have been mentioned. One great objection to the bone plate of Senn is the small calibre of the opening which results. Again, the material must pass by the bowel, and in doing so the piece of bone may possibly cause damage. To a great extent these objections are obviated by the rings of catgut. If these rings are examined closely it will be seen that they are very hard, large, and thick, and that it would be improbable that they should be absorbed in the length of time it would take for them to become loose. In ten days the rings used by Dr. Penrose had passed. We should not expect this ring of catgut to be absorbed in that time. If it should not be absorbed, it would not pass as readily as the rubber ring. The latter would cause no more trouble than so much tripe. The rubber rings could be readily kept for any length of time. The catgut rings, as Dr. Abbe explained, must be kept under compression in some solution, and must be carefully prepared by a comparatively tedious process. This is all obviated in the rubber ring. The approximation by rubber seems to have some advantage over catgut, and the catgut is a most decided advance on the bone plates.

DR. F. H. GROSS: In the case of artificial anus (the result of gangrene in strangulated hernia) referred to by Dr. Barton, I failed to find the lower end of the divided small intestine after judicious search, but reestablished the anastomosis between the small and large intestine by exposing the cæcum, and attaching thereto, by means of Dupuytren's enterotome, the upper portion of the divided bowel, and succeeded in converting the artificial anus into a fecal fistula, so that thereafter a portion of the feces passed per anum and a portion through the fistula. I have never felt satisfied that the lower end of the bowel could not be found, and in saying so to a medical friend, some time afterward, he remarked: "That critics might find fault where clinicians found impossibilities." There was some matting together of tissues to hinder the search.

I have, at least, the melancholy satisfaction in learning this evening that in a similar case another surgeon failed to find the lower end of a parted intestine.

THE PRESIDENT, DR. W. W. KEEN: I want only to say a word in regard to one of the cases narrated by Dr. Abbe. I was present at the operation, and certainly a more unfavorable case could not be imagined. The woman appeared upon the verge of the grave, and I expected to hear of her death in the course of a week, if not even earlier. It seemed impossible that she should recover, not only from the great emaciation, but also from the operation, which was necessarily very prolonged and very difficult, in consequence of the matting together of the intestines and surrounding parts. I certainly think that we are to be congratulated upon having such a valuable paper upon such an important topic, and that Dr. Abbe is to be congratulated upon such favorable results in such an unfavorable case.

I should scarcely have said anything, but I can hardly agree with the last remarks of Dr. Ashhurst in reference to making an artificial anus rather than performing immediate lateral anastomosis of the bowel. This seems to expose the patient to a greater risk, as it involves the performance of two operations instead of one; one an operation of necessity when the artificial anus would be made, and second a laparotomy when the lateral anastomosis would be made, which always involves some risks. I can see no valid reason why a patient requiring the formation of an artificial anus in many, if not in most cases, might not have the advantage of immediate lateral anastomosis, and thus avoid two operations, as the lateral anastomosis operation would be hardly more prolonged and involve no greater risk than the formation of an artificial anus, if, indeed, it is attended with as much risk. I should like to hear Dr. Abbe's views on this point. If I correctly understood the paper, this method was proposed not only for the relief of existing fecal fistulæ, but also for other conditions, such as shot-wounds, excision of the bowel, etc., which would require the formation of an artificial anus.

DR. ROBERT ABBE: I did speak of the use of this method in the immediate apposition of the intestine in dangerous cases, but I did not intend to emphasize this point. I am rather inclined to agree with Dr. Ashhurst in thinking that it is a matter for general recommendation that an artificial anus should be established. The discretion of a surgeon of considerable experience will, however, allow him to make immediate apposition in certain cases, but, for universal recommendation I think that often it would be attended with additional risk. If the patient may be hastened over the shock and an artificial anus established in a few moments, the second operation for anastomosis under favorable circumstances is attended practically with little risk. In cases of serious obstruction, lasting for three or four days with shock and intestines over-distended, I think that an artificial anus should be established.

With regard to the suggestion of Dr. Penrose, I think that some such device as he suggests may succeed everything that has yet been thought of. I do not vaunt the use of catgut rings as having any supremacy. I think that Senn's plates have advantages. In gastro-enterostomy they would be less easily digested than the catgut, but these simple rings have two or three undoubted advantages.

With regard to the absorption of catgut I know that it occurs in less than ten days. In both of the earlier specimens the catgut is gone, and in these the intestine was removed at the end of nine days. It will probably be absorbed in four or five days.

The catgut rings which you have been examining were taken out of alcohol and now after drying seem too pliant for service, but if placed in water they would at once stiffen up into dense, firm rings. When taken out of the alcohol and put in the intestine they swell a little, giving additional firmness and very tight apposition. Senn, in his experiments, oftentimes found the plates plugged by hair, straw, etc., which the dog had swallowed. This built up an obstruction at the operated part which produced serious trouble. These rings on the contrary have a very large aperture from the first—as large as two inches. In this narrowed form it slips readily into the incision in the bowel which closes over it, while the diamond-shaped

plates of Senn cause a curling over of the edge of the stretched small intestine. When the outside sutures are applied with catgut rings there is from one-fourth to one-half an inch of the two serous coats in contact. If you have more than that, as you do with bone plates, you take something from the lumen of the bowel which would be better left.

It has simply been the pleasure which I have had in reporting these cases that has led me to emphasize these methods to-night.

